

# Space News ROUNDUP!

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## Improved suit gives Virginia boy 'freedom'

By Audrey Schwartz Rivers

Like an astronaut who just stepped foot on a new world, a 6-year-old Virginia Beach, Va., boy explored Earth for the first time, thanks to improved NASA technology.

On April 19, Mikie Walker became the first American child to receive a modified "space suit" that protects him from ultraviolet rays of the Sun and other light sources. Mikie has porphyria, a genetic disorder that causes extreme and potentially dangerous sensitivity to sunlight that can

result in chronic skin inflammation and blistering, inflammation of nerves, abdominal pain and other disturbances. For some children with light sensitivity disorders, even a 40-watt light bulb spells danger.

JSC's Office of Technology Transfer and Commercialization offered the suit to Mikie through an agreement with the non-profit HED Foundation, Hampton, Va.

"To think that NASA astronauts walking on the Moon means a child now can play in the Sun," said

Sarah Moody, founder and president of the HED Foundation and Related Disorders which has worked with JSC's Office of Technology Transfer and Commercialization to provide the protective garments to needy children. The HED Foundation donates cooling gear to children with hypohidrotic ectodermal dysplasia (HED), multiple sclerosis, spina bifida, cerebral palsy and other genetic disorders. HED is a medical disorder characterized by a lack of sweat

glands that can lead to heat exhaustion, heatstroke and, in severe cases, death. Several thousand children worldwide suffer from genetic disorders that cause either extreme light sensitivity or problems with body cooling. Thirty children are on the foundation's waiting list for a suit like Mikie's.

The pint-sized space suit blocks nearly all of the Sun's ultraviolet rays. Mikie sports an improved version of a prototype protective suit JSC provided. Please see **BOY**, Page 8



NASA Photo S90E5085

Payload Specialist Jay Buckley, right, helps Payload Commander Rick Linnehan with a sleep cap. Several electrodes in the cap make contact with the skull to monitor electrical impulses from the brain during sleep and an electrode under the nose monitors respiration. The cap also monitors and measures electrical impulses from the muscles, eyes and heart as part of a study of astronaut sleep patterns in space. Associated with the experiment were waking tests of the astronauts breathing patterns and blood gasses.

## Neurolab crew brings home gain on brain

Following more than two weeks of on-orbit research designed to gain insight into the human nervous system, the STS-90 crew flying aboard *Columbia* returned to Kennedy Space Center on May 3.

*Columbia* touched down on KSC's three mile-long concrete runway at 11:09 a.m. CDT with the Neurolab crew—Commander Rick Searfoss, Pilot Scott Altman, Mission Specialists Rick Linnehan, Kay Hire and Dave Williams along with Payload Specialist Jay Buckley and Jim Pawelczyk—bringing back volumes of information gathered from the more than two dozen experiments they performed during the flight.

Following an overnight stay at the Florida spaceport, the STS-90 crew flew back to Ellington Field on Monday.

Joining family, friends and co-workers to welcome home *Columbia's* crew were hundreds of third and fourth graders from the Friendswood school system, which "adopted" the mission in its studies and made several field trip visits to JSC.

During their 16-day mission, the astronauts research efforts were monitored by eight science teams. Four teams with a combined total of 11 experiments used the astronauts as test subjects while the other four teams, through 15 different experiments, used a variety of animals as part of their data collection.

"Although the Spacelab flight is over," reported Neurolab Mission Scientist Jerry Homick, "the Neurolab program activities are far from completed. A significant amount of essential post-flight data is to be collected on both the crew members and animal test subjects ... and data analysis will continue for several weeks."

All of the teams studying human subjects reported receiving good data on their studies of how microgravity affects blood pressure regulation, eye-hand coordination, motor coordination, sleep disruption and the balance system of the inner ear.

The teams using animals included the Aquatic, Neuronal Plasticity, Mammalian Development and Neurobiology. The Aquatic team studying the Oyster

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## Saturn leader keys on training

Low lecturer credits line's success to customer focus

By Kelly Humphries

The man who helped launch General Motors' newest lines of cars and management told JSC managers recently that establishing core values, educating potential leaders and recognizing implementers are the keys to his company's recent resurgence.

Richard "Skip" LeFauve, former chairman of the Saturn Corp., and now GM senior vice president for global leadership development and global human resources processes, spoke to a packed Gilruth Center ballroom on April 22 as part of the George M. Low Leadership Series of lectures hosted by JSC Director George Abbey.

LeFauve said that when he took the reins of the new car company, named for the Saturn V rocket that "leapfrogged" the United States over

the Soviet Union in the space race, it was an experiment that GM management and the United Auto Workers union leadership hoped would turn around the giant automaker's slumping profits in the face of stiff overseas competition and point the way toward a new way of doing business. This means letting the union be involved in decisions such as engineering and picking advertising companies. The idea was to shift the roles of management and workers so that everyone focused on the customer and shared responsibility for the company's success or failure.

"The most important thing we learned is how important people are to success in any enterprise," said LeFauve, who also is president of

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## High school students taste thrill of zero-g

By Donn Sickorez

Tucked away in the back of the KC-135, four high school students and their teachers listen to the roar of the KC-135's engines as it gains altitude over the Gulf. This was it. Months of planning, preparation, meetings and weekend work has come to this moment.

Test Director Judy Rickard calls out "30 seconds" and the students do what they can to prepare themselves and their experiments for their first experience of weightlessness. As the engines' shout dissolves to a whis-

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JSC Photo 98E03368

Holly Hyde, left, an instructor from Clear Creek Independent School District, assists a student studying EVA construction activities as a part of the Fly High Program—JSC's pilot project to fly high school researchers on the KC-135 research aircraft.

## JSC making big plans for Inspection '98

A team of employees is working on plans for Inspection '98, scheduled in October.

JSC will invite business, industry, community and education leaders to inspect the facilities and technologies that are used to achieve the science, engineering, management and operations goals of the center.

Organizers will be making a call to submit exhibit proposals in the next several weeks.

For additional information on Inspection '98 or to volunteer, call Kathy Jurica at x34776.

# Thomas takes news of delayed shuttle ride home in stride

By Leslie Eaton

U.S. Astronaut Andy Thomas, on the Russian Space Station Mir, received news that his ride home will be delayed by a few days.

Shuttle managers announced that the launch of STS-91, the final planned shuttle-Mir docking mission, will be delayed until June 2.

Shuttle managers also noted that there will be a tanking test of the new lightweight external tank on May 18 and the STS-91 Flight Readiness Review is scheduled for May 20.

All systems aboard the Mir Space Station are in good working order as Russian flight controllers last week tested a new thruster assembly that was installed during a space walk by Mir 25 Cosmonauts Talgat Musabayev and Nikolai Budarin.

Following the checkout of the boom jet assembly atop the "Sofora" truss on the Kvant-1 module, the unit was integrated into the station's attitude control system to provide roll control that was temporarily handled by thrusters on the Priroda module.

Thomas, marked his 100th day in orbit May 1 and continues his scientific research program. His primary focus is on the Biotechnology System Co-Culture experiment. He provided the Mir Operations Support Team with the latest video of the unit, which has been operating since early in his stay on the station. The cause of air bubbles in the chamber still is being analyzed by experiment investigators, but has not appeared to hamper the growth of the three-dimensional cancer cells,

which are the focus of the experiment.

He also continues to periodically gather blood, urine and saliva samples to be evaluated after his mission on the effects of long duration space flight on the human body.

Science investigations by Thomas on Mir are part of 27 studies in the areas of Advanced Technology, Earth Sciences, Human Life Sciences, Microgravity Research, and International Space Station Risk Mitigation.

Thomas also took time from his science activities to answer questions that had been submitted by Australian school children. Answers to the questions are posted on the Internet at: <http://shuttle-mir.nasa.gov/shuttle-mir/mir25/status/current/thomas.html>



NASA Photo S90E5292

The seven-member STS-90 crew enjoys some time off during the marathon Neurolab research mission by rehearsing and performing its own downlink music video, complete with "cool" shades. Front row, from left, are Pilot Scott Altman, Commander Rick Searfoss, and Mission Specialist Kay Hire. Back row, from left, are Payload Specialists Jay Buckley, and Jim Pawelczyk, and Mission Specialists Rick Linnehan and Dave Williams.

## Science teams dive into ocean of data

(Continued from Page 1)

Toadfish reported receiving intermittent data, but enough to assume experiment success. Early post-flight evaluations indicate that about 90 percent of the 200 young swordtail fish that flew died, probably because their water was too warm.

The Neuronal Plasticity team saw rodents performing on the Escher Staircase and the Magic Carpet apparatus, although no data was collected on two of the four rodents. The investigator said that early data shows the experimental hypotheses can be evaluated. The planned number of rodent dissections were performed on orbit for the Neuronal Plasticity Team.

The Mammalian Development team dealt with the lessened number of young rats available after experiencing unexpected deaths within the litters and did achieve some data collection in the final days. The team redistributed the animals to assure that all the primary science requirements were met, with only secondary objectives partially affected by the smaller number of animals available.

"It was disheartening to me to see that happen," said Linnehan, a veterinarian who worked with other

crew members into his sleep shift to personally treat the newborn rats. "When you initially see this, you say, 'Oh, no!' Then we started treating. I guess the veterinarian in me kicked in. That's something that has to be taken into account in the future, how mothers are going to be able to rear, be it human or other species."

The Neurobiology Team studying the development of gravity sensors on crickets ran as planned with no hardware problems.

"We expected a lot of success, and our overall expectations were exceeded," Homick said. "We went into this mission with a number of challenges; a busy timeline, complex experimental hardware systems, and a number of difficult experimental procedures using cutting edge technology never before attempted in space flight."

*Columbia* for the most part operated smoothly, allowing the crew to devote its attention to meeting science objectives. Only a repair to the Regenerative Carbon Dioxide Removal System, which required a one-inch piece of aluminum tape and some ingenuity by engineers on the ground, and a work-around for a blocked waste water dump line were required during the flight.

## NASA tests hair-raising technique to clean up oil spills

Most folks with oily hair use shampoo to get the oil out. But one Alabama hairdresser likes oily hair and is working with NASA to use human hair to soak up oil spills. Researchers at Marshall Space Flight Center are testing a hair-raising recovery technique for oil spilled in water.

The idea is the inspiration of Phillip McCrory, a Madison, Ala., hairdresser. McCrory was watching television coverage of 1989's oil spill in Alaska's Prince William Sound. "I saw an otter being rescued whose fur was saturated with oil," said McCrory. "I thought, if animal fur can

trap and hold spilled oil, why can't human hair?"

In a home experiment, McCrory stuffed five pounds of hair he'd cut into a pair of his wife's pantyhose. He tied the ankles of the hosiery together to form a ring-shaped collection bundle. Then, filling his son's wading pool with water, he put the hair-filled ring of hosiery into the center of the pool and poured used motor oil into the middle.

"When I pulled the legs of the hosiery ring together, the oil had adsorbed onto the hair inside of it," McCrory said. "I couldn't see a trace of oil in the water." McCrory found

that human hair adsorbs—rather than absorbs—oil. That is, the oil gathers in layers on the hair's surface. This allows for easy recovery of the oil and its reuse by simply squeezing it from the collection bundles.

"When I wrung the hosiery out, most of the oil was recovered," said McCrory. "The remainder was broken down and disposed of when I washed the hosiery with detergent."

McCrory, who lives near Marshall, approached the Center's Technology Transfer Office with the proposal that NASA test his idea under controlled laboratory conditions. Marshall agreed because its researchers

believed it had potential use by NASA and other U.S. government agencies.

Successful field tests also influenced Marshall's decision to test McCrory's system further. In an initial test, David Glover, a chemical systems supervisor for Marshall contractor BAMS, Inc., filled a 55-gallon oil drum with 40 gallons of water and 15 gallons of oil. "The mixture was filtered through nylon bags filled with hair," Glover said. "When the water was tested after just a single pass through McCrory's innovative filter, only 17 parts of oil per million parts of water remained."

McCrory estimates that 25,000

pounds of hair in nylon collection bags may be sufficient to adsorb 170,000 gallons of spilled oil. Preliminary tests show that a gallon of oil can be adsorbed in less than two minutes with McCrory's method.

There's also a potential cost savings in McCrory's method. Present oil cleanup methods cost approximately \$10 to recover a gallon of oil. McCrory's system may cost as little as \$2 per gallon and offers the additional benefit of being able to use the recovered oil for fuel.

Tests of the new system are expected to be completed later this spring.

## Astronomers discover construction zone for planets around nearby star

NASA astronomers using the new Keck II telescope in Hawaii have discovered what appears to be the clearest evidence yet of a budding solar system around a nearby star.

Scientists released an image of the probable site of planet formation around a star known as HR 4796, about 220 light-years from Earth in the constellation Centaurus. The image, taken with a sensitive infrared camera developed at NASA's Jet Propulsion Laboratory, shows a swirling disk of dust around the star. Within the disk is a telltale empty region that may have been swept clean when material was pulled into newly formed planetary bodies, the scientists said.

"This may be what our solar system looked like at the end of its

main planetary formation phase," said Dr. Michael Werner of JPL, who co-discovered the region, along with Drs. David Koerner and Michael Ressler, also of JPL, and Dana Backman of Franklin and Marshall College, Lancaster, Penn. "Comets may be forming right now in the disk's outer portion from remaining debris."

The discovery was made on March 16 from the giant 33-foot Keck II telescope atop Mauna Kea, Hawaii. Keck II and its twin, Keck I, are the world's largest optical and infrared telescopes.

Koerner of JPL said the finding represents a "missing link" in the study of how planetary systems are born and evolve. "In a sense, we've already peeked into the stellar family album and seen baby pictures

and middle-aged photos," Koerner said. "With HR 4796, we're seeing a picture of a young adult star starting its own family of planets. This is the link between disks around very young stars and disks around mature stars, many with planets already orbiting them."

The discovery of the HR 4796 disk was made in just one hour of observing time at Keck, but the JPL team plans to return to Hawaii in June for further studies. They hope to learn more about the structure, composition and size of this disk, and to determine how disks around stars in our galaxy produce planets.

The Keck II image of HR 4796 and information on the MIRLIN camera are available on the World Wide Web at: <http://cougar.jpl.nasa.gov/mirlin.html>.



Dick Covey, senior manager on the Boeing Consolidated Space Operations Contract Team in Houston, presents one of four shuttle flags to Rick Piercy, center, chief operating officer of Lewis Center for Educational Research in Apple Valley, Calif., during dedication of a new addition. The center seeks to improve and expand science and technology education in the region. From left are Covey, San Bernardino County First District Supervisor Kathy Davis, California Assemblyman Keith Olberg, Boeing Reusable Space Systems Vice President and General Manager Rick Stephens, Piercy, U.S. Rep. Jerry Lewis (R-Calif.), California First Lady Gayle Wilson, NASA Administrator Dan Goldin and Jet Propulsion Laboratory Director Ed Stone.

## Community News

### Students learn about the brain

# Westwood Elementary students adopt STS-90 Neurolab mission

The students of Westwood Elementary School in Friendswood "adopted" the STS-90 mission, participating in a Neurolab-based educational outreach activity through the Education and Information Services Branch of the Public Affairs Office.

The program consisted of an educational activity that was carried out with the faculty and students of Westwood, in the Friendswood Independent School District. Westwood is a third- and fourth-grade campus only, and has 750 students and 35 teachers. Judy True and Becki Haner were the lead teachers for the activities.

The Neurolab project had its inception last fall when Norm Chaffee, of the Education and Information Services Branch at JSC, conducted a multi-day series of robotics presentations to the students at Westwood. True asked for suggestions for a broader project in the space science area which could involve the entire school. The Neurolab mission was suggested because of its rich set of human and animal studies which lend themselves to separate focused assignments for a large number of individual students or classrooms. Also, a large volume of classroom material was already developed for educational outreach about Neurolab.

As a result, all of the classes were involved in studying various aspects of the mission.

The Education and Information Branch supplied the Westwood teachers with a large amount of information to use to develop their teaching plans.

Each instructor received one of the multi-color Neurolab mission brochures, courtesy of the Space and Life Sciences Directorate at JSC, as detailed background material.

A package of information about the Neurolab websites was provided to the teachers, for background information and ideas for classroom activities and experiments. A notebook containing most of the Neurolab website materials also was provided to Westwood.

Each classroom at Westwood received a crew lithograph, mission patch decal and pocket-sized mission timeline summary. A limited number of cloth mission patches also was provided for lobby and cafeteria display.

One of JSC's Educational Outreach Specialists visited Westwood to give a series of four "Space Basics" briefings to all of the 750 students. The briefings helped the

students understand the basic science involved in some of the Neurolab research.

True and Haner created their own STS-90 Neurolab Mission Packet for all the teachers to use with their students. The packet contained numerous activities and experiments tailored for the third and fourth graders. The basic anatomy of the brain was studied by the students and the teachers made models of the brain that were similar in consistency, size and weight. The students learned about the feel (of the brain) as well as the fragility of the brain and how to protect it.

The teachers also had their students write letters to the astronauts and put together a package of the letters to the STS-90 crew telling the crew of their "adoption" and study of the Neurolab mission.

Several JSC employees, involved in the development of various experiments, visited Westwood prior to and during the mission to interact with "clusters" of classes and to provide some in-depth discussions about individual experiments. These visits also provided an important role model function.

The school followed the progress of the mission on-line by retrieving the regular mission status reports on the Internet. Students were encouraged to develop questions for the crew and Mission Control Center and send them over the Internet for answers.

A select group of teachers visited the center and observed some of the mission and experiment activity from the old Science Monitoring Area in Bldg. 36 as an enrichment experience.

Some of the students organized a field trip to Ellington Field to greet the crew upon their return. This helped them to follow the mission in its entirety.

Several Friendswood Senior High School media/journalism students videotaped and wrote about the students' activities. This gave the high school students an interesting project on which to work and provided a lasting record of what the elementary students did during the mission.

The Westwood students have created a website to chronicle their adoption of the STS-90 Neurolab mission and describe in detail the assignments they have completed while learning about the mission. The Westwood Elementary website may be accessed via the Internet at: [http://www.friendswood.isd.tenet.edu/www/sts\\_90\\_shuttle\\_mission\\_ado.htm](http://www.friendswood.isd.tenet.edu/www/sts_90_shuttle_mission_ado.htm).



Adrian Gonzales, a parent volunteer at Hall Elementary School in League City, places student work on a bulletin board. The students wrote stories and created their own illustrations as a part of the new literacy initiative being supported by JSC volunteers.

## JSC provides reading tutors to Hall Elementary

JSC has developed a comprehensive program to support Gov. George W. Bush's focus on reading by providing 45 JSC employees to serve in the Clear Creek Independent School District as reading tutors at Hall Elementary School in League City.

"The Johnson Space Center has pledged to Gov. Bush our strong support of his literacy initiative for the youth of Texas," said JSC Director George Abbey. "Tutoring the children at Hall Elementary School is one of several components of our support to enhance the reading skills of children in Texas."

The program started with 12 JSC employees providing reading and math tutoring to 14 at-risk students at Hall Elementary School.

A needs assessment by CCISD showed reading tutors to be of greatest assistance and of most value in improving student performance.

In January 1998, the school identified additional students who would greatly ben-

efit from one-on-one reading tutoring. In response to the need for more tutors, the Education and Outreach Program recruited another 45 employees to serve as reading tutors.

Gretchen Thomas, a lead project engineer in the EVA and spacesuit systems branch described her involvement as "a very rewarding experience."

"I sit down with my student and she can read an entire book to me without help. This amazes me to think that during my first tutoring session, my student could barely sound out simple words at an agonizingly slow rate. I'm very proud of her."

In order to improve student performance at Hall Elementary School, JSC reading tutors meet with the students on a weekly basis during school hours.

JSC's support of Bush's literacy initiative will continue to be expanded in the 1998-99 school year with a similar reading program at CCISD's Stewart Elementary School in Kemah.

## JSC Safety Alert

### Relief Valve Failure in High Pressure System

#### What Happened

On March 5, 1998, a relief valve catastrophically failed, separating at the inlet port-body bushing interface. The body of the valve flew off and struck the corrugated siding of the building eight feet above its initial position, making a fist sized dent in the building. The valve then ricocheted off the building and hit the ground approximately 20 feet away, leaving a small impact crater. No one was hurt.

#### Results of the Investigation

The investigation revealed that the valve, an Anderson, Greenwood and Company Model 81MB88-4L, was set for an operating pressure of approximately 3,000 psia and failed most likely due to damaged threads.

The investigation also revealed that the exit port for the relieving valve was oriented in such a configuration that the high pressure discharge could cause the relief valve to unscrew.

#### What You Can Do

Work with the Pressure System Manager's Office (PSMO) to inspect all Anderson, Greenwood and Company Model 8100 series relief valves immediately.

Inspect all of your relief valves to assure that relieving gas can not cause any connections to unscrew. Replace any damaged or defective high pressure components. When possible isolate high pressure systems from inhabited office areas or areas with high value equipment.

For more information on this failure, call the PSMO at x37511. The PSMO will be contacting all organizations that are known to have valves potentially affected by this type of failure. <http://www4.jsc.nasa.gov/safety/alert/>

## Gilruth Dinner Theater presents murder mystery

Tickets are on sale for the Gilruth Dinner Theater presentation of "Murder on the Happy Trail" at 7 p.m. May 29 in the Gilruth Center ballroom.

During the show, the audience will witness a murder and have the opportunity to assist in solving the crime. Members of the audience participate by grilling the suspects, putting all of the clues together to determine who committed the murder and why. The audience will be broken down into teams by tables and there will be six or eight seats per table. Each team will be allowed only one guess to correctly identify the murderer and the motive.

"Murder on the Happy Trail" is a

murder mystery-comedy with a western theme. "The owner and crew of the Tri-six Ranch have been invited to a social at a neighboring ranch. This is supposed to be a charity fundraiser but, someone is raising funds for herself."

The social begins at 6:30 p.m., dinner is served at 7 p.m. and the play begins at 8 p.m. Tickets are \$18.50 per person and include a dinner of Cajun chicken with rice, Creole green beans, salad with dressing, desert and beverages.

The Gilruth Dinner Theater is sponsored by the JSC Employees Activities Association. For details, contact Mavis Ilkenhans at x49644.

## Space history club plans first session

An initial planning meeting discussing the formation of a Manned Spaceflight History (MaSH) Club is scheduled for 11:30 a.m. June 17 in Bldg. 45, Rm. 651.

The goal of the club is to provide a forum for individuals interested in discussing or learning about the his-

tory of the human space flight program and the people involved in space programs worldwide. The agenda for the meeting also will include a presentation on the JSC Oral History Project. For additional information, call Michael Ciancone at x38848.

# The New Moody

## Moody Gardens' Discovery Pyramid sports new exhibits



Photo by Rita Karl

The Discovery Museum at Moody Gardens on Galveston Island is completing a major, six-month renovation with help from a team of JSC advisers. JSC volunteers, who played a major role in design and execution of the initial human space flight display, also are helping train Moody Gardens staff members so the museum can better explain NASA's space flight program to its visitors.

"The educational partnership between JSC and Moody Gardens (which hosts more than a million visitors a year) has allowed for the development and design of many new exhibits in the museum due in large part to the efforts of a wonderful team at JSC," said Rita Karl, Discovery Pyramid manager.

This is Phase II of the on-going project. The first phase opened last year after extensive participation by JSC employees. As many as 200 JSC workers were involved at times in development of the complex, designed to entertain and to show what NASA and JSC do and why.

Called "Living in the Stars," the display is on the second floor, the exhibit floor, of the Discovery Pyramid. The pyramid also houses the IMAX Ride Film in three 18-seat motion-based theaters.

The fascinating, wide-ranging exhibits show many facets of U.S. and international space activity. Phase II has updated and improved the exhibits of the first phase, which opened in June 1997.

Work on the project began in mid-1966. The Moody Foundation suggested to JSC Director George Abbey that the two cooperate in a Moody Gardens expansion project. About 50 JSC workers from nearly every center organization formed five teams to develop ideas for the project. The best elements of each of their proposals were the basis for exhibits in the 6,000-square-foot area.

### The Exhibits

As visitors walk up the stairs to the second floor, they encounter a space suit with a manned maneuvering unit suspended from the glass ceiling. When guests approach the

entrance, which is modeled after the shuttle airlock, they are greeted by an astronaut video with narration in English and three other languages.

A right turn takes visitors to an area illustrating some of the scientific principles of space flight. Visitors learn about Kepler and his Law of Planetary Motion, Galileo and his Law of Falling Bodies, Newton and his Laws of Motion, Einstein's Theory of Relativity and Hubble's discovery of the Red Shift. Hands-on activities demonstrate these principles.

Illustrations show guests how astronauts live in space. The International Space Station and Pathfinder's trip to Mars are shown before visitors reach a crew training area.

There, a docking trainer exhibit allows some visitors to practice docking the shuttle with the Russian Mir Space Station using the same software that astronauts use in their training. The software was donated by JSC. The rest of the group is able to watch the simulation on a large-screen television.

The same area houses other computer training programs similar to those used by the astronauts. The programs have been modified by the Mission Operations Training Division to allow guests to learn about crew escape systems, space suits (American and Russian) and the Mir space station. They also provide a virtual tour of the shuttle flight deck, Earth observation images from space, a shuttle landing video and a performance by the astronaut band Max-Q.

### Hubble Images

A Hubble Space Telescope kiosk allows visitors to peruse Internet sites pertaining to Hubble and its fascinating images of our universe and solar system. Nearby, a simulator allows visitors to build and explore their own space station.

The United Space Alliance-sponsored exhibit, "Mission Control Galveston," shows shuttle orbit tracking, live NASA Television, and three interactive computer programs on shuttle history, shuttle missions and virtual tours of JSC and Kennedy Space Center.

The International Space Station

Habitation Module is a full-sized, walk-through mock-up of the module with floor and ceiling graphics, porthole, hatches, toilet, shower, recycling display, plant growth chamber and a galley.

Shannon Lucid's "What's Cooking in Space" video also is part of the habitation module. A mock-up bioreactor for growing cell tissues in space and a virtual tour of the ISS modules also are located in this exhibit.

The new "Discovery Science Theater" runs the film "Towards Mars."

The X-38 model, by the same JSC team building and testing the real thing, is a two-thirds scale mock-up that allows two visitors to sit inside, check out the actual X-38 switch panels and view a video of the X-38 re-entry.

### Launch, Re-entry

The "Space Shuttle Theater" shows a 20-minute film (created in conjunction with JSC) of the launch and re-entry of the shuttle from inside the cockpit, various space walking activities and the assembly of the space station. This theater also is connected to live NASA Television and broadcasts each mission and special events live.

"To The Planets" is a theater that allows visitors to choose any of several films of the digital flyovers of Venus, Mars, Miranda or the Apollo Program's Lunar Rover on the Moon.

The "Mars Surface Operations Exhibit" allows guests to teleoperate a rover across the surface of Mars (complete with simulated Mars soil) and remotely sense different rocks.

The museum displays two of the simulated Mars surface tiles created by JSC for use in KC-135 Mars excursion suit experiments. Coming soon will be a simulated drill that will allow visitors to pull a core sample from the simulated Martian surface.

The JSC Graphics Department and Public Affairs Office contributed to designs enhancing each of the museum areas, including the astronomy area that features a Moon rock sample and a sample of a meteorite.

### Looking Ahead

The "NASA Future in Space" display features a short film about NASA's future missions and two computer kiosks with Internet connections. There, guests can learn more about living in space, space travel, and benefits of space research.

Wayne Ordway, a systems integration manager in the Space Shuttle Program Office, said shortly before the opening of the first phase last year that the project was "an example of outstanding community collaboration and teamwork. Everyone involved at JSC has felt a sense of ownership.... It was really a just a group of talented people committing their time and effort in a very motivated way."

Those words are as true as Phase II opens as they were then. They will be just as true when Phase III, now in the planning stage, welcomes its first visitor.

Doug Ming, a space scientist from the Earth Sciences and Solar System Exploration Branch, is the team lead for Phase III. One goal is to design a Mars outpost with surface system operations and a habitat. Its exhibits will include telemedicine and "Living off the Land." It will show some of the plants that Mars explorers could grow.

"We will have a simulated Mars surface with robots controlled by the people in the habitat," Ming said. The exhibit also will show science that will be conducted on Mars including looking for signs of life, and how water could be extracted from the planet's surface.

Other plans include new interactive exhibits by Access Multimedia. They include: The human research facility on the International Space Station, a scale showing what visitors would weigh on other planets, a model of the magnetic-plasma rocket engine being studied for potential interplanetary trips, and space station and Mission Control simulations for school groups.

The museum activities compliment those of Space Center Houston, JSC's official visitor center. Both are major tourist attractions. JSC officials say both help tell the story of human space flight, a story that cannot be told too widely or too often. □



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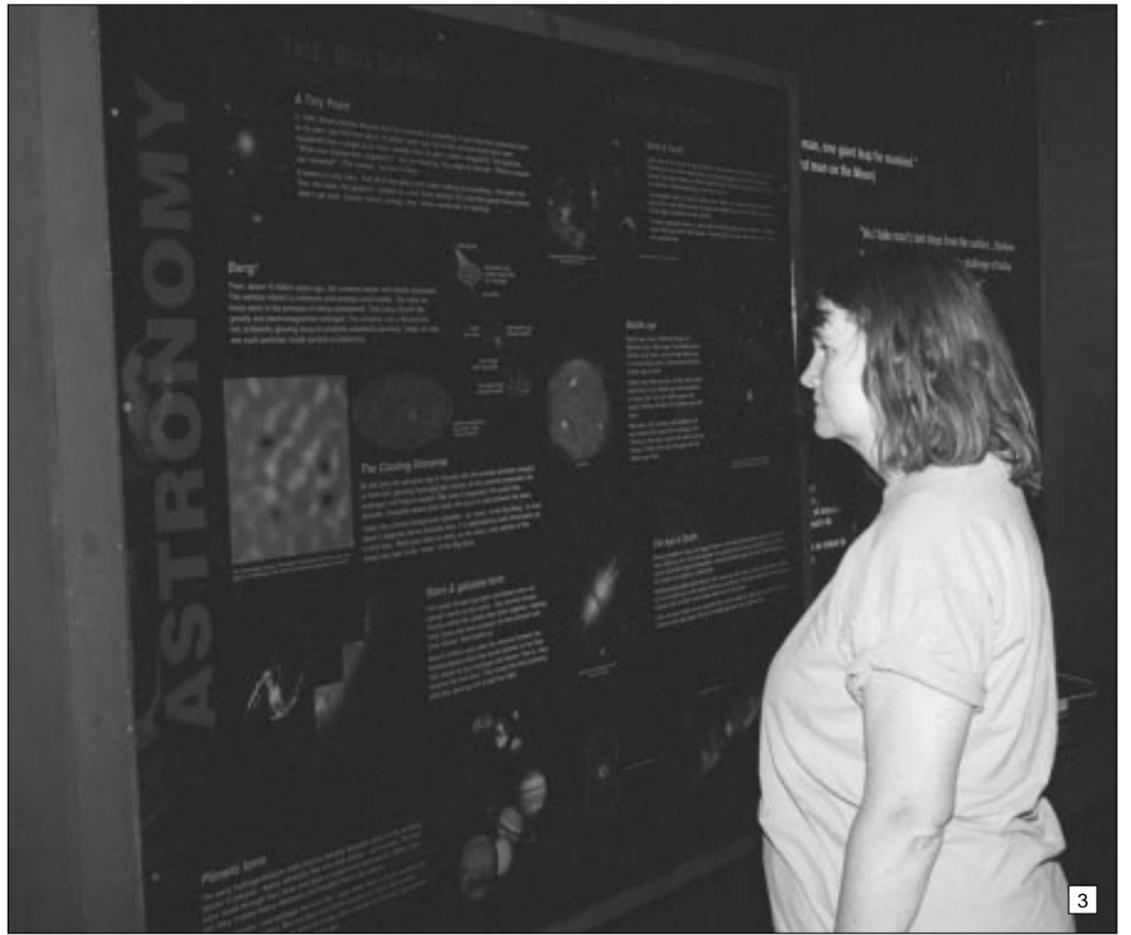


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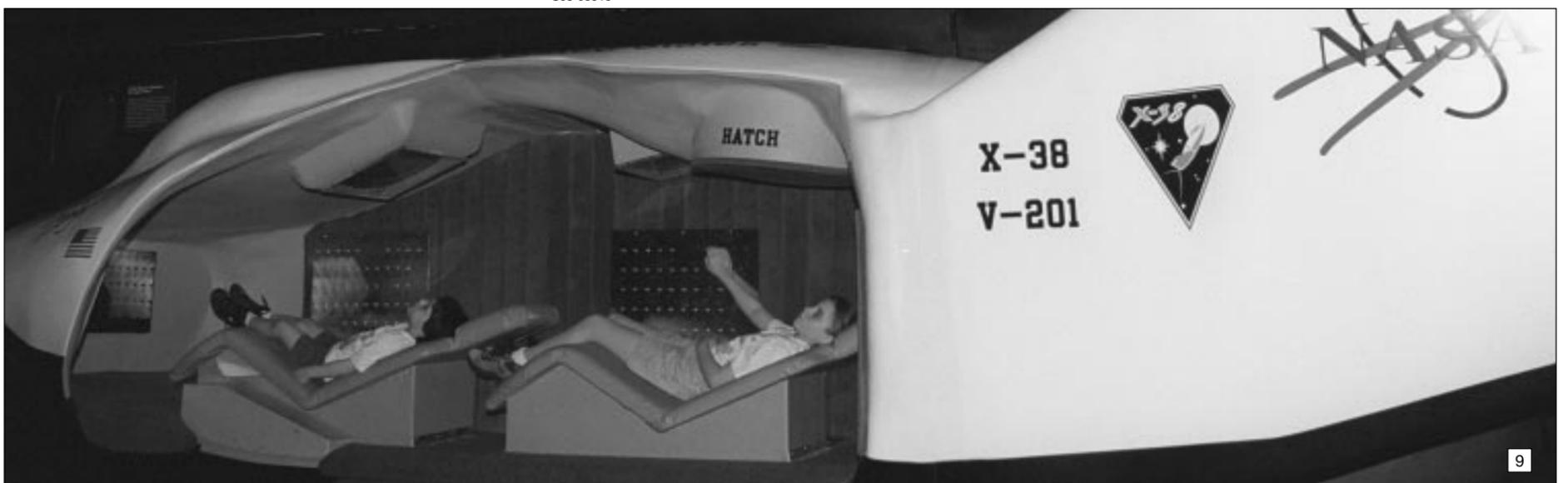
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- 1) Pete Alcocer, a tour guide at Moody Gardens Discovery Pyramid, gives a lift to the "EVA astronaut" that greets visitors to the museum.
- 2) Travis and Amy Ashley drill a core sample of Martian soil at the Mars Surface Operations Display.
- 3) Dayna Lee, a student from Texas City, watches the bioreactor simulator turn in the Space Station Habitation Module.
- 4) Charles, Nikita and John, from Houston, visit the new Space Station Habitation module. Charles and Nikita check out the astronaut sleeping bag secured above her, while John cautiously investigates the bathroom facilities.
- 5) Mission Control Galveston offers visitors virtual tours of the JSC, Kennedy Space Center, information about the space shuttle and a history of the missions, computer tracking of the shuttle during missions and live television from NASA. Visitors may select the virtual tours from the consoles. The display is sponsored by United Space Alliance.
- 6) A Moody Gardens tour guide explains the science behind special glasses that break light down into its component colors. The guests are wearing the glasses as part of a demonstration at the Discovery Science Theater.
- 7) The Discovery Science Theater offers visitors demonstrations and scientific explanations of principles of physics with the use of educational toys.
- 8) Carla Renfro, an astronomy student from Olathe, Kan., reads about new astronomy discoveries using the Hubble Space Telescope.
- 9) Travis and Amy Ashley from Kingwood experience the X-38 mockup that allows visitors to view a video of an X-38 flight test.



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S98-05512

# 35 Years Ago at MSC

## Grumman Aircraft Engineering Corp. builds LEM which will one day touch down on the Moon's surface

Excerpts reprinted from the May 1, 1963, issue of the Space News Roundup.

When Grumman Aircraft Engineering Corporation was founded in 1929, its first business was repairing Loening amphibians. Today the Long Island company is developing the vehicle under a NASA contract administered by the Manned Spacecraft Center, which will land the first American astronauts on the moon.

Since the company was selected as the prime contractor for the LEM program, it has completed preliminary analysis of equipment that might be considered for common usage for the command and service modules and LEM in a joint investigation with MSC; presented to MSC a preliminary configuration aimed at an early freeze of the LEM design; established permanent representation at MSC and Atlantic missile range, as well as technical liaison in Los Angeles for California subcontractors; begun development of plans for propulsion system testing at the White Sands missile range; and selected four major subcontractors for negotiations.

As of the month of April, approximately 1,000 personnel had been assigned to the LEM program. It is currently anticipated that the staff complement on the LEM program would more than double by the end of 1963.

Grumman is now completing a funded study for NASA designed to investigate the supplies necessary for support of the astronauts during an extended stay on the moon. Begun in September, the \$79,095 study was completed in February.

As an addendum to this lunar logistic study, Grumman's preliminary design department analyzed the basic LEM vehicle for its suitability to carry several payloads. Recently presented to NASA, the study indicates that the descent stage of the lunar excursion module could be stocked with the necessary provisions to extend a lunar

mission another 70 days.

In addition to carrying staples (food, water, oxygen, spare space suits and backpacks, a power supply and other life support items), the LEM descent stage, or "truck," as Grumman calls it could also accommodate a 10-foot diameter, pre-assembled shelter which would protect the astronauts from the lunar hazards of micrometeorite showers, and solar flares. The shelter could also contain enough life support, power supply and communications equipment to sustain astronauts for as long as three months.

Another possibility would be the inclusion of a lunar roving vehicle which could be used by the astronauts for cargo carrying purposes.

The LEM-truck would be capable of carrying a total payload of about 7,500 pounds. The concept, should NASA decide to employ it, could be accomplished with minimum modification to the basic LEM design and maximum development efficiency.

Another related facet of the logistic problem—the locomotion and control of lunar vehicles—was first investigated by Grumman under a company-funded study in preparation for the prospector program.

The company's advanced development department continues to correlate optical, thermal and radiometric measurements of these samples for further comparison to "signatures" provided by the actual surface.

Consequently, engineers at Grumman have developed a type of wheel which is thought to be suitable to locomote a lunar vehicle because of its characteristics. Called a "metalastic" (metal-elastic) wheel, tests conducted in unconsolidated sandy type substances indicate the wheel has the properties of large footprints for weak soil, low unsprung weight to accommodate the dynamics of reduced lunar gravity and invulnerability to micrometeorites and low temperatures.

The company has already prepared

several alternative preliminary designs of lunar roving vehicles utilizing metalastic wheels.

A great deal of effort is expended in Grumman's research and advanced development departments on study programs which are associated with manned space flight but not necessarily with the lunar program. Among these studies is one designed to investigate whether it is possible for astronauts to live comfortably in space stations rotating faster than four revolutions per minute, possibly as high as eight revolutions per minute.

Only the first half of this program has been completed, but trends detected in the study of test subjects indicate that it may be possible for humans to perform space station functions at approximately 8 rpm for extended periods, if the radius from the hub is about 50 feet. The increased rotation, however, is not without its penalty of limiting the normal head motions a man might make.

Experiments are being conducted in an enclosed environment, a 10-foot by eight-foot by eight-foot tilting room located on the company's 46-foot-diameter centrifuge. Further experiments with the tilting room and the centrifuge will be performed to confirm results already indicated about the effects of a rotating environment in the regions about 8 rpm upon man.

Some other study work Grumman is performing in the research and advanced development departments include a simplified guidance scheme for re-entering spacecraft; the direct use of human balance and reflexes for vehicle control; remote control of an unmanned lunar vehicle from Earth; thermal control and dynamic control of a rotating space station; and manned simulator studies of Earth entry and orbital rendezvous.

In addition to these studies, the company has just begun advanced design work on a vehicle which could be used to carry astronauts to Mars.



Top: Examining a one-eighth scale model of the lunar excursion module are (left to right) Rep. George Miller, chairman of the House Science and Astronautics Committee; Joseph Gavin, Grumman vice president, and Joseph Mullaney, program director at Grumman for the lunar landing vehicle. Bottom: Astronauts Jim Lovell and Elliot See operate the lunar landing simulator at Grumman Aircraft.



## Gilruth Center News

**Hours:** The Gilruth Center is open from 6:30 a.m.-10 p.m. Monday-Thursday, 6:30 a.m.-9 p.m. Friday, and 9 a.m.-2 p.m. Saturday.

**Sign up policy:** All classes and athletic activities are on a first come, first served basis. Sign up in person at the Gilruth Center and show a yellow Gilruth or weight room badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

**Gilruth badges:** Required for use of the Gilruth Center. Employees, spouses, eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday; and 9 a.m.-2 p.m. Saturdays. Cost is \$10. Dependents must be between 16 and 23 years old.

**Nutrition intervention program:** Learn more about the role diet and nutrition play in your health. This six-week program includes lectures, a private consultation with the dietitian and blood analysis to chart your progress. The program is open to all employees, contractors and spouses. For more information call Tammie at x32980.

**Defensive driving:** One-day course is offered once a month at the Gilruth Center. Pre-registration required. Cost is \$25. Call for next available class.

**Stamp club:** Meets at 7 p.m. every second and fourth Monday in Rm. 216.

**Weight safety:** Required course for employees wishing to use the Gilruth weight room. The next classes are scheduled for at 8 p.m. May 14 and 28 (must be on time to receive credit for class). Pre-registration is required. Cost is \$5. Annual weight room use fee is \$90. Additional family members are \$50.

**Exercise:** Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

**Aikido:** Introductory martial arts class meets from 5:15-6:15 p.m. Tuesday and Wednesday. New classes begin the first of each month. Instruction is by a fourth-degree black belt. Learn to defend yourself and get a great aerobic workout. Cost is \$35 per month.

**Step/bench aerobics:** Low impact cardiovascular workout. Classes meet from 5:15-6:15 p.m. Mondays, Tuesdays and Thursdays. Cost is \$32 for eight weeks. For more information, call Kristen at x36891.

**Yoga:** Stretching Class. Low impact exercises expertly designed for people of all ages and abilities in a Westernized format 5-6 p.m. Thursdays. Cost is \$32 for eight weeks.

**Ballroom dancing:** Beginning and advanced students meet from 7-10 p.m. Thursdays. Cost is \$60 per couple.

**Country and western dancing:** Beginner class meets 7-8:30 p.m. Monday. Advanced class (must know basic steps to all dances) meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

**Fitness program:** Health Related Fitness Program includes a medical screening examination and a 12-week individually prescribed exercise program. For more information call Larry Wier at x30301.

**Gilruth Home Page:** Check out all activities at the Gilruth online at: <http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm>

## Ticket Window

Bldg. 3 Exchange Store hours are 7 a.m.-4 p.m. Monday-Friday.  
Bldg. 11 Exchange Store hours are 9 a.m.-3 p.m. Monday-Friday.  
For more information, please call x35350.

The following discount tickets are available at the Exchange Stores:

General Cinema Theaters	.....	\$ 5.50
Sony Loew's Theaters	.....	\$ 5.00
AMC Theaters	.....	\$ 4.75
Astroworld Early Bird Tickets (valid thru 5/31)	.....	\$18.50
Astroworld One Day Admission	.....	\$24.25
(valid at all Texas Six Flags Theme Parks)		
Astroworld Season Pass	.....	\$57.75
(valid at all Texas Six Flags Theme Parks and Water World)		
Moody Gardens (2 of 6 events)	.....	\$ 9.75
Sea World	.....adult \$27.25	.....child (3-11) \$18.25
Schilletterbahn	.....adult \$20.75	.....child (3-11) \$17.50
Space Center Houston	.....adult \$10.25	.....child (4-11) \$ 7.00

Metro Tokens and value cards available.

**Coming Soon:** Splashtown Water Park and Houston Comets Tickets.  
Mark your calendar for the Book Fair - May 5-7.

## Roundup Deadlines

The Space News Roundup is published every other Friday. Story ideas should be submitted as far in advance as possible, but no later than two weeks prior to the date of publication.

The deadline for Dates & Data calendar items is three weeks prior to the date of publication. Stories and ideas should be submitted to Editor Kelly Humphries in Bldg. 2, Rm. 180, or via e-mail to [kelly.o.humphries1@jsc.nasa.gov](mailto:kelly.o.humphries1@jsc.nasa.gov).

Retirees should submit change of address notices to the distribution group at Mail Code BT552 or call Ignacia Ramirez at 281-483-6161.



JSC Photo 98-05534

Carol Hill, secretary to the Director of Business Management, receives the Marilyn J. Bocking award for secretarial excellence from JSC Director George Abbey.

## Hill receives top secretary honors

Carol Hill, secretary to the Director of Business Management recently received the Marilyn J. Bocking award for secretarial excellence. Hill was recognized for her competence in dealing with the overall business responsibilities of the center.

James Shannon, director of business management, stated, "Carol brings to this senior position the highest of personal and professional integrity, polished technical skills in providing leadership to the directorate secretarial staff and a genuine caring attitude for others."

Shannon also stated that Hill, "has organized and structured the flow of correspondence and reporting through the directorate office in a highly competent and professional manner."

Shannon noted that Hill, "has provided an organizational structure and process flow that significantly enhances the competence of the directorate."

Hill also was cited for stabilizing the large volume of work moving through the directorate and for providing an organizational structure and process flow that significantly enhances the competence of the directorate.

## JSC ready for Savings Bond campaign

JSC is ready to kick off its annual Savings Bond campaign on Monday. "I'm pleased to announce the beginning of the 1998 U.S. Savings Bond Campaign at JSC and encourage your participation in this worthwhile effort," said JSC Director George Abbey. "The purchase of savings bonds is important both to the well-being of the nation's economy and to the personal savings programs of individuals."

The purchase of savings bonds is a transaction where both the buyer and seller profit. Interest rates are market based and are adjusted every 6 months, climbing as market rates increase. Each May 1 and November 1, the Treasury announces the rate which is 90 percent of the average 5-year Treasury security yields for the 6 months before the rate announcement. Bonds earn those rates right from the start; the current

rate is 5.59 percent. Bonds cashed before 5 years are subject to a three-month interest penalty.

"The purchase of U.S. Savings Bonds is an investment in tomorrow," Abbey said.

"The program provides numerous other advantages. Interest earned, for example, is not subject to state or local taxes, and Federal tax liability can be deferred until the bonds are cashed. In addition, when bonds are redeemed for the purpose of financing higher education—yours or your children's—interest earned under some circumstances is completely tax free. I encourage each of you to talk to your organization's representative to learn more about the Savings Bond program," he continued.

"Our campaign will run May 11-25, during which time you will receive more information about the program," Abbey noted. "NASA's goals this

year are to have a 5 percent increase in the number of employees participating; a 10 percent increase in the level of savings by current participants; and a 50 percent or more level of participation. I encourage all employees who do not now participate to consider this investment alternative. For those of you who already participate, I encourage you to consider increasing your payroll deductions," he said.

Campaign coordinator Teresa Sullivan said bonds are available in \$100, \$250, \$500 and \$1000 increments and the minimum biweekly allotment is \$3.75

"I look forward to your support and commitment to this very important program, Abbey said. If you have questions about U.S. Savings Bonds, contact your directorate campaign coordinator or Teresa Sullivan at x31034."

## People on the Move

Human Resources reports the following personnel changes as of April 25, 1998:

### Key Management Assignments

Mark Hammerschmidt was selected as chief, Guidance, Navigation and Control Design and Analysis Branch, Engineering Directorate.

Cliff Hess was named chief, Special Projects Office, Engineering Directorate.

Betsy Hodges was selected as chief, Supply and Materials Branch, Center Operations Directorate.

Dave Ladrach was selected as manager, Engineering Products Office, Space Shuttle Program Office.

Rich Rodriguez was selected as chief, Crew Station Branch, Space and Life Sciences Directorate.

### Additions to the Workforce

John Ira Petty joins the Public Affairs Office as a public affairs specialist.

Connie McLendon joins the Transportation Branch in the Center Operations Directorate as a secretary.

### Promotions

Debra Eaton was selected as the secretary of the Institutional Business Management Office.

Debra Wilson was selected as the secretary of the Occupational Safety and Institutional Assurance Division in the Safety, Reliability, and Quality Assurance Office.

Linda Green was selected as the secretary to the manager, White Sands Test Facility.

### Reassignments Between Directorates

Chris Gerty moves from the Engineering Directorate to the Mission Operations Directorate.

Peter Bethke moves from the International Space Station Program Office to the Engineering Directorate.

Dave Whittle moves from the Safety, Reliability, and Quality Assurance Office to the Space Shuttle Program Office.

Dalia Riojas moves from the Mission Operations Directorate to the International Space Station Program Office.

### Reassignments to Other Centers

Chris Popp of the Engineering Directorate moves to the Marshall Space Flight Center.

Jack Bullman of the International Space Station Program Office moves to the Marshall Space Flight Center.

## President salutes public employees

President Bill Clinton saluted the millions of Americans who devote their time and talents to public service in a special Public Service Recognition Week (May 4-10) message this past week.

"Public service is among the most noble—and demanding—of vocations," the President wrote. "Throughout my years in government, I have been privileged to know and work with extraordinary men and women who have recognized both the responsibilities of public service and the opportunities it offers to improve the quality of life for others."

"Day in and day out, in a variety of settings and at every level of government, these quiet heroes work to give their fellow citizens the tools and opportunities to make the most of their lives," Clinton wrote. "Providing vital family, health, and educational services, improving transportation and water quality, defending our freedom and preserving our environment, each day public employees meet the needs of a dynamic and diverse population. They have succeeded in making government work better and cost less, in forging effective partnerships at all levels of the government, and in honoring the trust placed in them by their fellow citizens."

"On behalf of a grateful nation, I salute America's public employees for the hope and help you bring to individuals, families and communities every day. You have dedicated your skills and energy to fulfill America's bright promise for all our people, and you have rightly earned the respect and lasting appreciation of all those you have served."

## Krishen appointed to medical physicists board

The Texas Board of Licensure for Medical Physicists recently appointed JSC's Kumar Krishen to its ranks.

The board oversees licensing and licensing procedures for professional medical physicists and processes complaints.

Krishen, chief technologist for the technology transfer and commercialization office at JSC, is responsible for developing strategies for joint research and technology projects and plans with other

NASA centers, industries, universities and other government agencies. Krishen also represents JSC as the principal technologist on the NASA Council on Science and Technology.

Krishen earned a bachelor of science degree in mathematics and physics, a masters degree in radio physics and electronics, and a doctorate in electronics.

Krishen was appointed to an unfilled position on the board through January 1999.

## Dates & Data

### May 8

**Space society meets:** The Clear Lake chapter of the National Space Society will meet at 6:30 p.m. May 8 at the Radisson Hotel, 9100 Gulf Fwy. in the Deer Park room. Dr. Kenneth Cox, assistant to the director, engineering directorate, will speak on "A Futurist' Perspective for Space." For additional information, call Murray Clark at 367-2227.

**Astronomers meet:** The JSC Astronomical Society will meet at 7:30 p.m. May 8 at the Center for Advanced Space Studies, 3600 Bay Area Blvd. Jim Morrison will speak on celestial time keeping. For details, call Chuck Shaw at x35416.

### May 12

**ISS media workshop:** Reporters and editors from around the world will be at JSC May 12-14 for an International Space Station Media Workshop. Televised briefings on NASA TV and demonstrations are planned. For more information, call the JSC Newsroom at x35111.

**NPMA meets:** The National Property Management Association will meet at 5 p.m. May 12 at

Robinette and Doyle Caterers, 216 Kirby in Seabrook. Dinner costs \$14. For details, call Sina Hawsey at x36582.

**Aero club meets:** The Bay Area Aero Club will meet at 7 p.m. May 12 at the Houston Gulf Airport clubhouse at 2750 FM 1266 in League City. For additional information, call Larry Henderson at x32050.

### May 13

**Spaceland Toastmasters meet:** The Spaceland Toastmasters will meet at 7 a.m. May 13 at the House of Prayer Lutheran Church. For details, call George Salazar at x30162.

**Communicators meet:** The Clear Lake Communicators will meet at 11:30 a.m. May 13. For information and location, contact Henry Duke at 280-4403 or Melissa Sommers at 332-0698.

**Spaceteam Toastmasters meet:** The Spaceteam Toastmasters will meet at 11:30 a.m. May 13 at United Space Alliance, 600 Gemini. For details, call Chuck Kubricht at 282-3908 or Brian Collins at x35190.

**Astronomers meet:** The JSC

Astronomy Seminar will meet at noon May 13 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information, call Al Jackson at x35037.

**PSI meets:** The Clear Lake NASA Chapter of Professional Secretaries International will meet at 5:30 p.m. May 13 at Bay Oaks Country Club. Cost is \$21 for dinner. For information, call Elaine Kemp at x30556.

### May 20

**Spaceland Toastmasters meet:** The Spaceland Toastmasters will meet at 7 a.m. May 20 at the House of Prayer Lutheran Church. For additional information, call George Salazar at x30162.

**Communicators meet:** The Clear Lake Communicators will meet at 11:30 a.m. May 20. For additional information and location, contact Henry Duke at 280-4403 or Melissa Sommers at 332-0698.

**Spaceteam Toastmasters meet:** The Spaceteam Toastmasters will meet at 11:30 a.m. May 20 at United Space Alliance, 600 Gemini. For details, call Chuck Kubricht at 282-3908 or Brian Collins at x35190.

**MAES meets:** The Society of Mexican American Engineers and Scientists will meet at 11:30 a.m. May 20 at Bldg 16 Rm. 111. For details, call George Salazar at x30162.

**Astronomers meet:** The JSC Astronomy Seminar will meet at noon May 20 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For additional information, call Al Jackson at x35037.

**Scuba club meets:** The Lunafins will meet at 7:30 p.m. May 20 at Pot Pie Pizzeria at Watergate Marina. For additional information, call Mike Manering at x32618.

### May 21

**Child care board:** The Space Family Education board of directors for the JSC Child Care Center will meet at 11:30 a.m. May 21 in Bldg. 45, Rm. 712D. For additional information on this open meeting, call Gretchen Thomas at x37664.

**SHPE meets:** The Society of Hispanic Professional Engineers will meet at 6:30 p.m. May 21. For additional information and location, call Juan Anaya at 587-6824.

**AIAA meets:** The American Institute of Aeronautics and Astronautics will meet at 7 p.m. May 21 at the Gilruth Center grand ballroom. Jim Adamson, chief operating officer for United Space Alliance, will speak on "Shuttle Privatization." The social begins at 5:30 p.m. with dinner at 6:15 p.m. Reservations are required by May 15. For details, call Janet Stewart at 333-6724 or Nellie Moen at x30934.

### May 27

**Astronomy seminar:** The JSC Astronomy Seminar will meet at noon May 27 in Bldg. 31, Rm. 129. Dr. Larry Friesen will speak on "Hypervelocity Impact with Light Gas Guns." For additional information, call Al Jackson at x35037.

**Spaceland Toastmasters meet:** The Spaceland Toastmasters will meet at 7 a.m. May 27 at the House of Prayer Lutheran Church. For details, call George Salazar at x30162.

**Spaceteam Toastmasters meet:** The Spaceteam Toastmasters will meet at 11:30 a.m. May 27 at United Space Alliance, 600 Gemini.

## NASA Briefs

### New device uses reflectivity to detect plant stress earlier

Thanks to a new imaging tool developed at Stennis Space Center in South Mississippi, farmers and foresters may now be better able to detect unhealthy crops and trees before the damage becomes visible to the naked eye—information that may be used to increase crop production. Plant stress is the adverse reaction of plants to environmental conditions that are unfavorable to growth, such as lack of sufficient nutrients, inadequate watering, disease or insect infestation. The reaction with which most people are familiar is a change in leaf color, but research has found that in many cases, pre-visible signs of stress can be detected using the proper instruments and techniques. Plant stress can be monitored, in part, by observing variations of the plant's reflectance in two specific wavebands of light. Relative levels of chlorophyll, the pigment that enables photosynthesis and gives plants their green color, can be determined by measuring the plant's reflectance of light in those parts of the spectrum.

### NASA, EPA help cities study ways to use urban forests

Three U.S. cities will partner with NASA and the Environmental Protection Agency to study how strategically placed "urban forests" and the use of reflective surfaces may help cool cities, reduce pollution, lower energy bills, modify growth plans and help mitigate further deterioration of air quality. Researchers from Marshall Space Flight Center will study bubble-like accumulations of hot air, called urban heat islands, and how these change between day and night. Heat islands develop over cities as naturally vegetated surfaces are replaced with asphalt, concrete, rooftops and other man-made materials. The researchers want to demonstrate that by "cooling" a city, it is possible to directly reduce energy use by buildings, which in turn reduces greenhouse gas emissions and ultimately improves the air quality. Additionally, individuals, businesses and governments can save money by reducing the amount of energy consumed. Based on the results of the project, the science team plans to disseminate its findings nationally so other cities also can incorporate what the team has learned into their long-range growth plans.

## Boy makes first 'Earth walk' on trip to lake

(Continued from Page 1)

ed last September to 4-year-old Kyle and 2-year-old Ryan Richards of Shotton Colliery, England. The brothers have Polymorphic Light Reaction Syndrome, a serious allergy to light that causes severe skin lesions. Last fall, the boys, who looked like junior astronauts, wore their protective suits to Disney World in Orlando, Fla., and also viewed a space shuttle launch at the Kennedy Space Center.

Thanks to the "expert" feedback provided by the Richards brothers, NASA developed an upgraded version of the protective garment. The suit's headpiece was redesigned totally to enhance ventilation and reduce overheating in the head area.

"The body cooling system was changed from a battery-powered liquid pump unit to a passive phase change vest, made of material similar to freezer cold packs used for sports injuries. The vest is simple, less expensive and more durable than the original battery pump," said Robert Dotts, assistant director of Technology Transfer and Commercialization.

The new phase change vest is easier to use for both children and their families and brought the cost of the entire suit down to about \$1,700 from more than \$2,000, Dotts said.

MicroClimate Systems Inc., of Sanford, Mich., supplied the phase change vest, and the Solar Protective

Factory of Carmichael, Calif., provided the protective outer garments. DRLI Co., which supplies protective coatings for astronaut's space suit helmet, supplied the clear UV-blocking coating for Mikie's face visor.

According to HED Foundation's Moody, who presented the NASA suit to the Walker family, a giggly, jumping Mikie couldn't wait to don his "space suit" and explore the outdoor world of his home planet for the first time. The family headed for a local lake and, for the first time as well, Mikie could look at the scenery out the van's windows. Previously, the passenger windows of any vehicle Mikie rode in had to be completely covered to prevent

expose to sunlight.

Taking a cue from Apollo astronauts, Mikie picked up rocks and tossed them into the first large body of water he'd ever seen. He became attracted to a patch of buttercups and gathered a bouquet for his mother. Staring up at a tree he announced, "Someday I'm going to climb a tree just like my older brother." He adopted "Sparky," a caterpillar he found crawling on his gloved hand.

"It is said that a person never walks as tall as when he stoops down to help a child. Well let me tell you, there's many, many tall people who work at NASA," said HED Foundation president Moody.



NASA-WSTF 0398-0645

**TOUR DE FORCE**—Russian propulsion systems manager Felix Lebedev (arms folded, sunglasses) and a group of engineers from JSC supporting the International Space Station recently visited White Sands Test Facility. The entourage also witnessed the firing of an OMS engine, examined shuttle flight and test hardware and observed operation of a developmental unit of the space station oxygen recharge compressor being designed and built at WSTF. From left: Charlie Goldstein, Todd Peters, Dave Harris, Maureen Dutton, Terrence Kelly, Tien Nguyen, Lebedev, Mark Kitt and Francisco Hernandez.

## New pagers have local area code

Starting this month, almost all JSC employees who use pagers will get new ones as the center joins other NASA installations using the new agencywide pager contract awarded to Air Touch Inc.

The pager contract provides new pagers using the 281 area code and reduces JSC's costs, said Jim Doyle the Information Systems Directorate's pager coordinator. The contract offers paging capabilities and services comparable to the pagers being replaced.

During the past five years, JSC's pagers have been provided by Mobilecomm. That contract expires in July. The incremental exchange of pagers will be conducted from May 1 to July 1 through directorate and division offices. ISD will work with those offices to minimize the impact and inconvenience of the exchange.

"I've laid out a plan to exchange pagers within an organization to allow them to update their contact lists once," Doyle said. "This is also a good time to look at where pagers are assigned to make sure they are being used appropriately."

Replacement pagers will be issued to contractors with approval by the appropriate JSC contracting officer. Lost Mobilcomm pagers will be reported by completing a Report of Survey describing the nature and circumstances connected with the loss of this leased equipment. For details, call Doyle at x34048.

## Don't forget to recognize implementers: Low lecturer

(Continued from Page 1)

the newly created GM University. "People need to feel a sense of participation in the decision process. People need to be involved in decisions that affect them.

"Think about this country. That's what we're founded on," he said. "As a result, our government sustains itself through some very tough times."

When GM began to explore these different ways of doing things, he said, management decided that if union workers were going to begin participating in the decision-making process, it would have to teach them about business. Saturn started a program that would require 92 hours a year of education and training for everyone in company. Each employee would be involved in a risk and reward system that included a 20 percent pay cut that they would "buy back" by completing their training.

Saturn managers also had to take the pay cut and were required to

teach the classes, but earned double credit for teaching. The kicker was that all of their employees had to complete their 92 hours as well.

"It was a magical thing," LeFauve said. "In the process of 92 hours, we had to think up what it is we were going to teach, what it is we wanted people to know. We began to teach people simple things, like what are we all about? What is the purpose of Saturn? What's the purpose of NASA? What's the purpose of General Motors? You've got to know that in order to do your job. In the process it was very interesting how hungry the people were for that knowledge."

The classes made it clear to workers that the company would not survive if customers didn't buy its product. Employees on the factory floor began asking questions like "How many cars do we have to sell to pay for this thing you in management want to do?"

Management had never been challenged in that way before, he said. And it led to the establishment of core values for everyone in the company, one of which was a dedication to "customer enthusiasm."

"You will never be second guessed if you do the right thing for the customer" was the slogan, LeFauve said. "We generally exceeded the customer's expectations. I think that's what really built the Saturn brand, was this sense of focus on the customer."

LeFauve, who began his GM career in 1956 as an engineer with Packard Electric Division in Warren, Ohio, said he is sometimes asked whether leaders are born or made.

"It doesn't make any difference. There are so many of them around us that we don't know about. There are leaders everywhere at different parts of the organization at different stages of development. There are hundreds of leaders that haven't

been recognized yet. That's what we learned at Saturn."

The key, he said, is helping them along in their development.

"The way you transfer knowledge is through a formal recognition of education and training. Every one of us as a leader has a responsibility to be exposed to new ideas, to discuss them, to buy into them and then to teach them. If you are still teaching or managing the way you managed 10 years ago, shame on you unless you're a wonderful person and were 10 years ahead of your time."

In honoring employees, those who are often forgotten, LeFauve said, are the implementers.

"In my company, I recognize implementers, I don't recognize new ideas. Ideas are a dime a dozen—it's the people who make new ideas work. We would like to have people fail on new ideas with the idea that we'll know at least that we're trying new ideas."

## High school students learn much from zero-g flights

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per, that curious sensation of not-ready-for-prime-time physics comes about. They are experiencing what only a handful of human beings have—the feeling of weightlessness.

Bobbing and weaving like a boxers in a prize fight, the first members of the high school KC-135 flight program take their readings and make observations. Back at Ellington, ground crews and other team members huddle around the TV set in the flight ready room. Images of their teammates alternately floating and then being pressed into the KC-135's padded floor fill the screen.

This is science in action, proving the concepts that they have only read about; this is loosing the surly bonds of Earth and learning that science has few, if any, boundaries. "Cool!"

was the one-word summary most often given during and after the flight.

The students were participants in the Fly High Program, JSC's pilot project to fly high school researchers on the KC-135 research aircraft. Students flew experiments examining microgravity measuring devices, global positioning systems, blood pressure, coatings inside microcapsules, magnetic fields and EVA construction activities. Teachers accompanied their students and participated in the experiments.

"NASA is always looking for ways to use its mission to encourage young people to study science and technology," said Donn Sickorez, NASA university affairs officer. "This program seemed like a logical outgrowth of our undergraduate student flight program."

In that program, teams of undergraduate students were competitively selected to fly their experiments on the KC-135 in the Spring of 1997. NASA's Education and Information Services Branch, in partnership with the Texas Space Grant Consortium, which administers both programs, worked with science coordinators from Clear creek, Houston and Austin independent school districts.

The teams reported their mentors—Coy Kouba, Dennis Morrison, John Charles, Kevin Hames, Russell Carpenter, Susan Gomez, Chad Rowe, Linda Godwin, Mary Flores, Alan Currie and Loretta Hidalgo—were a valuable resource in terms of technical help and inspiration.

"The best part of working with the students was seeing talented high school students get a chance to see

a unique environment in which real work is done for the space program," Godwin said. "I feel it is extremely important to bring the 'real world' into high school classes. There, it is often difficult to visualize 'what you want to do when you grow up' because the educational environment is mostly classroom-related."

Another strongly positive outcome was that students generally surprise themselves, and learn more than the required technical facts. Michael Cox, a junior from LBJ High School in Austin said, "I think that dealing with the politics and red tape that surrounded this entire project (at least locally) was an education in and of itself. Realizing just how important politics and human interaction are gives new light to the complexity of the real world."



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